OEL 1166-64
30 November 1964

MEMORANDUM FOR : Chief, Ground Systems Division

SUBJECT : Optical Data Recording and Processing

1. At the present time a number of our systems are severely limited because we do not have adequate capability for recording wide bandwidth information without using unacceptable amounts of power and recording material. This problem is particularly accute in the development of equipment for clandestine ELINT.

2. At the present time recording is done on tape and there has been an increasing tendency to record digitally rather than in an analog format. A specific current problem involves recording a 25 bit word at 50 microsecond intervals. Actually, a 32 bit word is more desirable. This situation jeopardizes our ability to use receiving equipment whose development is nearly complete. There are no developments, of which I am aware, which indicate that our recording problems can be resolved in the near future by improved tape recording.

3. I believe that the potential of making optical recordings at various grey levels on film has been ignored. This technique has the advantage of a much higher capacity in terms of information packing density. Further, use of grey levels appears to be more adaptable to film than to tape when high speed recording is required. We have done very little work in this area using only cathode ray tubes to produce film exposure.

4. A number of techniques may be used to obtain the electro-optical transform. For example, gas filled arc lamps can be obtained which are very small and require reasonable amounts of power. Another promising technique which is now becoming highly developed is the illuminiscent panel. Extensive investigation has been done by

Ratheon and other electronic companies. Here for example, matrix of very small wires may be used in conjunction with a density wedge so that grey level can be selected by the use of the proper pairs of wires in the orthogonal matrices. Lenses may be used to focus the output of such a display onto a single line of film, or it may be possible to develop a direct writing capability. The present problem of recording a 25 bit word in 50 microseconds, however, might well be solved through straight forward use of cathode ray tube techniques.

5. Will you please define the requirements which are most pressing with regard to this problem? These should include the necessity for writing a digital code, writing grey codes, word size, speed, and an estimate of the data translation reduction process. This definition, 25X1A while broad, should be sufficiently definitive so that proposals can be requested from one to three organizations for study contracts of the order of [redacted] each. These study contracts should provide as a minimum the following :

a. A review of the applicable literature to determine useable techniques and the present and near term limits of these techniques against the defined requirements;

b. A relative evaluation of the techniques; and,

c. Recommend development follow on programs.

Consideration should be given to such firms as Eastman Kodak, Ratheon, Hughes, IT&T, and others who have background in Data Recording Processing particularly electro-optical processing.

25X1A

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DAD/S&D/OEL

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